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WILLIAM H. EDWARDS.

Our readers will all, we are sure, be glad to receive with the first number of a new volume of the CANADIAN ENTOMOLOGIST the accompanying excellent portrait of the well-known and now venerable Entomologist, Mr. W. H. EDWARDS, of Coalburgh, West Virginia. His life-long work has been the study of Diurnal Lepidoptera, and the results of that work are splendidly set forth in the beautifully illustrated volumes of his "Butterflies of North America." In April, 1868, the first part was issued, and at once commended itself to entomologists everywhere by the exquisite beauty and finish of the plates and their faithfulness to nature. In July, 1872, the first Series, forming a large quarto volume with fifty plates, was completed. The second Series, containing fifty-one plates, was begun in May, 1874, but not finished until November, 1884, the less frequent issue of the parts being more than compensated for by the increased value of both plates and letterpress. When the work was begun, as Mr. Edwards stated in his preface, little or nothing was known of the eggs, larvæ or chrysalids of any except the commonest butterflies, and accordingly his first volume illustrated only the perfect state. In 1870 he made the notable discovery that eggs could be satisfactorily obtained by confining the female butterfly of any species with the growing food-plant of its larva, and at once began the study of the life-histories of a number of species previously known only in the imago state. The results of these studies are admirably set forth in the letterpress as well as in the plates of the second and third Series; on these are accurately depicted eggs and larvæ in their different stages, as well as chrysalids and imagoes. Many wonderful discoveries have been made during these investigations, among the first being that of the seasonal trimorphism of *Papilio Ajax*, and the dimorphism of *Grapta Interrogationis*, and of *G. Comma*. The process of breeding was soon taken up by Mr. Edwards's friends and correspondents all over North America, and, aided by the general extension of railways over the Continent, he was able to get eggs of butterflies from widely distant localities,

and to follow them successfully through all their stages. Thanks to his efforts, the reproach of ignorance of the preparatory states of our butterflies has been removed, and though much remains to be learnt, vast progress has already been made. The first part of the third Series was issued in December, 1886, and in October last we had the pleasure of welcoming the sixteenth. Far from showing any decline from the Author's high standard of excellence, this last issue may justly be regarded as the climax of good work, both on the part of the writer and the artist. All through Mr. Edwards has been fortunate in having his wishes so ably carried out by his artist-assistants, Mrs. Mary Peart, of Philadelphia, who has drawn most accurately nearly all the plates, and, in order to do so satisfactorily, has reared most of the caterpillars, and Mrs. Lydia Bowen, who has so exquisitely performed the work of colouring.

In addition to the great work that we have just referred to, Mr. Edwards has contributed largely to the periodical literature of science, especially to the Proceedings and Transactions of the American Entomological Society and the CANADIAN ENTOMOLOGIST. His first contribution to our pages was published in the third number of our first volume, in 1868, and he has continued to favour us with articles of great value ever since; his last paper, in the September number of Volume XXVII., being the one hundred and sixty-eighth which he has written for our journal.

Mr. Edwards was born on the 15th of March, 1822, and will soon complete his seventy-fourth year. That he may long be spared in health and prosperity to carry on his excellent work is the cordial wish of the writer and all his friends. C. J. S. B.

THE "BOMBYCES": WHAT ARE THEY?

BY HARRISON G. DYAR, PH. D., NEW YORK.

It might be better to say "what were they?" in an article addressed to readers of to-day, since the name in its old sense will not be found in the most recent writings of Packard, Comstock, Chapman, Grote, and other authors. However, the group is adopted in our latest check-list (Nos. 877–1459), although without its name, Prof. Smith stating that he could not limit the group to his satisfaction. Also, as recently as 1893, Dr. Packard published an "Attempt at a new classification of the Bombyces," including in the group all the families formerly included, but altering their sequence. Following the arrangement of suborders pro-

posed by Prof. Comstock, and the division into superfamilies which I have suggested and which Mr. Grote has adopted with improved nomenclature*, let us see where the families of "Bombyces" fall.

From the JUGATÆ, we find the Hepialidæ only, the most highly specialized Jugates in respect to the abortion of the mouth parts. From the FRENATÆ as follows:—

Superfamily Tineides.—The Eucleidæ, Megalopygidæ, Anthroceridæ and Pyromorphidæ from the apex of development along the main stem; the Psychidæ, Lacosomidæ and Heterogynidæ, side branches, but all specialized (the much specialized Sesiidæ went with the Sphingidæ), and finally the Cossidæ, a low type, but of large size.

Superfamily Agrotides.—All the families, except those called Zygænidæ, the Agrotidæ and Geometridæ, the two latter (with the exception of the Notodontidæ) the lowest types in the superfamily.

Superfamily Bombycides.—The whole group.

Superfamily Sphingides.—None, this group being recognized as distinct, although the Sesiidæ and Thyridæ were associated with it.

Superfamily Papilionides.—None.

Thus it will be seen that the Bombyces consisted of the higher types in all lines of development, regardless of relationship. If we imagine the genealogical tree of Lepidoptera as growing upright from the ground, the several branches and twigs representing the families and being of length proportional to their degree of specialization, the old classification would be represented by *horizontal* planes. The uppermost would cut off the very summit of the tree, the Papilionides; the next would take the next succeeding top branches, perhaps the Sphingides, and the tip of a side branch from the Tineid trunk, say the Sesiidæ. The next cut might give the old Zygænidæ, consisting of some families from the Agrotid and Tineid trunks, and the fourth cut is our Bombyces, taking branches of all the trunks that are approximately equal in degree of specialization. The base of the tree would comprise the rest of our old familiar families, the Noctuidæ, Micros, etc.

It is the aim of more recent work to follow the lines of genealogy, a classification cutting our imaginary tree in *vertical* planes, including in each group all families related to each other in the same line of descent, regardless of degree of specialization.

*Syst. Lep. Hildesiæ, 1895.

CONCERNING FELTIA, AND OTHER MATTERS.

BY JOHN B. SMITH, SC. D.

The question asked by Mr. Slingerland in his very interesting paper in the CAN. ENT., XXVII, p. 301, is in great part answered by himself. I think he shows very conclusively that *subgothica*, Haw., is correctly used for our American species, and has given us a very full statement of the evidence upon which he bases his conclusions, thus removing the matter from the domain of unsupported opinion. From the nature of the case, and in the absence of Haworth's actual type specimen, the proof cannot be absolute; but until something more definite is supplied, I think the conclusions of the paper on the identity of *subgothica*, must be accepted. As to the synonymy, I think Mr. Slingerland is also correct. I have not found the A. O. U. Code clear on this matter, though it is as to genera in the same case; but, after consulting Dr. C. Hart Merriam, a recognized authority on questions of nomenclature, I am assured that Guenée's name *jaculifera* must sink as a synonym. On this, the main features of the paper, I accept all of Mr. Slingerland's conclusions; but I was a little surprised to find him defending genitalic characters as possibly good for generic divisions, in the apparent belief that I had used these characters as a basis for my division of the mass of species I found lumped as *Agrotis!* I believe that, with the possible exception of Mr. Scudder, no one in America has studied the genitalia of more insects of all orders than I. Certainly no one has figured more, and no one has insisted more strongly upon the value of these characters for specific distinction. I have examined in some cases over one hundred specimens of a single species without discovering appreciable variation, and while I was engaged in the study of *Lachnosterna* I examined nearly 2,000 specimens of the *fusca* group alone; for these characters. Yet, while insisting on their specific value, I have also pointed out that while easily distinguished species often have very similar genitalic structures, very closely allied species—superficially—may have them utterly unlike. Nowhere have I ever claimed that genitalic characters afford good bases for genera; on the contrary, I am distinctly of the opinion that they should not be used except in very special cases. The only instance where I have yet found it desirable to make use of them as a sole character, is in the series of species which I have called *Porosagrotis*. That is an expediency genus, and stated as such, with the reasons for it.

Yet, somehow, the idea seems to be current that all my work, in *Agrotis* at least, is based on genitalic characters only! Mr. Dyar, in a book notice, CAN. ENT., XXVII., 225, says: "Under Agrotis the *genitalic divisions** of Prof. Smith are given subgeneric value only, a proceeding which commends itself to the present reviewer." So Mr. Slingerland, on pp. 306 and 307 of the paper already cited, accepts this as a correct statement, and voices a doubt as to the value of such a basis. I was interested enough to write Mr. Slingerland on the subject, and he frankly acknowledged in return: "Yes; I simply followed Grote and Dyar in my statements regarding your divisions of the genus *Agrotis*." And Mr. Dyar, I have no doubt, simply followed Mr. Grote! Now, I would not be understood as questioning for a moment the divine right of a critic to condemn without reading or understanding the work criticised, or to impute views to suit himself; but I must confess that I am inclined to have more regard for comments when the criticism indicates an understanding of the author's actual position. But perhaps this is merely a prejudice on my part!

Yet it is something of a surprise that Mr. Grote's statements concerning my work or views should find unquestioned acceptance anywhere. When any of my papers are under his consideration, condemnation is nearly always certain, and Mr. Grote is always a much-abused individual. If the facts do not bear out the desired conclusion, why so much the worse for the facts. For instance, we find in the CAN. ENT. for 1894, Vol. XXVI., pp. 82 and 83, the following plaint:—"Prof. Smith goes still further. He suppresses my reference of the species described by Moeschler as *islandica* to *opipara*, in 1892, as cited above, and has the courage to write, 'the error is Mr. Grote's for condemning Mr. Morrison's species on insufficient grounds!' By also suppressing Moeschler's original determination, I am brought in for a synonym I never committed!" If reference is made to my Revision of *Agrotis*, Bulletin No. 38, U. S. Nat. Mus., p. 183, the following will be found: "Mr. Grote was correct in referring *opipara* and *islandica*, Moeschl. (nec Stgr.), as synonymous. The error is Moeschler's in failing to recognize the distinction between the forms, and Mr. Grote's for so positively condemning Mr. Morrison's species on insufficient grounds." How much now remains of Mr. Grote's complaint? If the curious reader will take the trouble to look into the

*The italics are mine. Note the plural. Mr. Grote uses *all* my divisions as subgenera.

literature of the subject, I think he will find Mr. Grote's criticisms on Mr. Morrison's writings and on the species described by him, at least severe enough to justify my statement.

So I am charged with ignoring Mr. Grote's work, and of failing to give him due credit. He writes (Abh. des. n-w Ver. zu Bremen, XIV., p. 16 of separate), after quoting my statement of the bases for subdividing *Agrotis*: "This is only a restatement of my original recommendation. As a matter of fact, throughout Smith merely applies rigorously the structural characters pointed out *by me* long before, and which I lacked time and material to ascertain in the case of each species. In this same paper I say: 'Subdivisions of the genus can be undertaken when the form of the genitalia is studied. This character, taken in connection with the antennal structure, will give us subgenera and assist in the identification of our numerous species.' This is precisely what Smith gives us after a lapse of seven years, and without making proper mention of *my initiatory* work. *He follows my lead as if I had not pointed out the way.*"* Mr. Grote is quite right in the statement that I gave him no credit for the characters used by me, and this is simply because they were not in any sense of the word original with him. Lederer used them in his work on the European Noctuids, so long ago as 1857, and so many other writers, antedating Mr. Grote, used them, that they long since became common or universal knowledge. I made no claim to originality in their use, and concede none to Mr. Grote. I made a bald statement of the characters employed; nothing more. I do claim originality, however, for the use of the claspers instead of the side-pieces (harpes) alone. Lederer used the latter only, and Mr. Grote nowhere went further than Lederer.

Mr. Slingerland questions also whether we shall use *Feltia* or *Agronoma*, because Mr. Grote asserts that the two are synonyms and the latter, with *vestigialis* as type, antedates *Feltia*. Mr. Slingerland failed to find material in Mr. Grote's writings to determine the matter and, quite correctly, does not accept his bald statement as decisive. I gave in my Revision (p. 109), under *Feltia*, the following: "The distinctive characters of the species grouped under the present term are, spinose and quite heavily armed fore tibiæ; protuberant, rough front, pectinated or serrate antennæ, usually wide wings with dark colours and a tendency to

*The italics are mine.

a radiate type of maculation." Mr. Grote, writing from Europe, of a common European species, presumably had specimens at hand for examination, and to the scientific student it would seem as if a clinching argument could be presented in the simple statement that *vestigialis* presented just these structural characters. But except for a reference to the maculation, such a statement is carefully avoided! It may be added, indeed, that in nearly every case where Mr. Grote has replaced a generic name proposed by me by an "earlier" term, he gives no structural characters to sustain his point. It is loose assertion merely. I found in the Martindale collection at the Ac. Nat. Sci. of Philadelphia, a good pair of *vestigialis;* through the courtesy of Mr. E. L. Graef, of Brooklyn, N. Y., I obtained another pair; and from the U. S. National Museum I obtained two additional males, by the kindness of the officials in charge. I compared these carefully with the descriptions of the species accessible to me, that no reasonable doubt might exist as to their identity and then found, as I had expected from Mr. Grote's silence, that there is no protuberant, rough front, and there are no heavily armed fore tibiæ! The species belongs to *Agrotis* as restricted by me. If, as Mr. Grote states, *vestigialis* is the type of *Agronoma*, this name can never replace *Feltia*, with *ducens (subgothica)* as type, whether we use it in a generic or subgeneric sense. I have absolutely no prejudice in favour of any of the generic names adopted or proposed by me, and am ready to suppress any or all of them in favour of others previously used. I ask only that there shall be a scientific demonstration of their identity; not merely a loose statement without facts given to support it. Lepidopterists have been too long looked upon as triflers rather than as students, because of this very lack of scientific accuracy in their work; but I am happy to say that to the more recent writers, including the Messrs. Slingerland and Dyar, this reproach cannot be made. With the beginning of a Scientific study, structural characters are discovered in all stages that upset our previous notions, and the classification of the order is therefore in an unsettled condition. I believe that it will remain so for some time to come; but every accurate contribution adds clearness, and while their novelty may induce the placing of too much stress upon newly discovered facts, they will, eventually, be fitted into their proper places.

Now, concerning the term *Noctuidæ* which Mr. Grote proposes to replace by *Agrotidæ!* He says: "The family name *Agrotidæ* is proposed instead of the usual term *Noctuidæ* since the generic title *Noctua*

is preoccupied" (Abh. Naturw. Ver. Brem., XIV., p. 1 of separate), and again (l. c, p. 21): "The term *Noctua*, used by authors for this section, is, as I understand the matter, preoccupied in the Birds and, according to the rules, cannot be used a second time in Zoology." Again no facts are given, and again Mr. Dyar repeats, CAN. ENT., XXVII., 225, "The name *Agrotidæ* is proposed for the customary *Noctuidæ*, as the term *Noctua* is preoccupied in Birds." Mr. Dyar thus seems to accept the change and repeats, as a fact, Mr. Grote's positive statement that the name is preoccupied. It may be so; these gentlemen may have information not accessible to me, and in order to bring it out I state my own knowledge as follows:—

In Scudder's "Nomenclator" we find

Noctua, Klein, Moll., 1753,
Noctua, Fabr., Lep., 1776,
Noctua, Sav., Aves., 1809,
Noctuæ, Linn., Lep., 1758.

In the Century Dictionary, that marvellous storehouse of terms, the same order is observed: *(a)* an old genus of Mollusca, Klein, 1751; the date here differing from Scudder; *(b)* a genus in Lepidoptera, and *(c)* a genus of Owls by Savigny in 1809.

I cannot find in any dictionary of Ornithology any earlier use of the term *Noctua*, though this of course does not prove that there is none.

Noctua, Klein, 1751 or 1753, is certainly the earliest use of the term; but here we run up against the following:

"Canon XII.—The Law of Priority begins to be operative at the beginning of Zoological nomenclature."

"Canon XIII.—Zoological nomenclature begins at 1758, the date of the Xth edition of the 'Systema Naturæ' of Linnæus."

We find that the term *Noctuæ* was used for the Lepidoptera in the very publication with which Zoological nomenclature begins, although *Noctua* as a generic term in the order is to be credited to Fabricius.

It is possible, of course, that some publications exist, which were overlooked by the authorities cited by me; but if this is so, Mr. Grote certainly owes it to Zoological Science at large to refer to them, and to give the reasons for rejecting *Noctua* as a term "preoccupied in the Birds."

LIST OF HYMENOPTERA TAKEN AT SUDBURY, ONT.

BY JOHN D. EVANS, TRENTON, ONT.

In the following list 283 species are enumerated, 34 not determined specifically, and there are 8 species unknown, making a total of 325 species. I am much indebted to Mr. W. H. Harrington for his very great kindness and valued assistance in identifying these insects.

Collecting was also done in some of the other orders, viz.: Diptera, Orthoptera, and Neuroptera; more especially in the first mentioned, in which many fine specimens were taken, and await determination :—

Cimbex americana, *Leach.*
=*var.* 10-maculata, *Leach.*
Trichiosoma triangulum, *Kirby.*
Hylotoma clavicornis, *Fab.*
" McLeayi, *Leach.*
" scapularis, *Klug.*
Priophorus æqualis, *Nort.*
Nematus aureopectus, *Nort.*
" inquilinus, *Walsh.*
" lateralis, *Nort.*
" luteotergum, *Nort.*
" malacus, *Nort.*
" placentus, *Nort.*
" rufocinctus, *Hargtn.*
" ventricosus, *Klug.*
" violaceipennis, *Nort.*
Harpiphorus maculatus, *Nort.*
Dolerus aprilus, *Nort.*
" arvensis, *Say.*
" bicolor, *Beauv.*
" sericeus, *Say.*
Monophadnus rubi, *Harr.*
Macrophya albomaculata, *Nort.*
" epinota, *Say.*
" flavicoxæ, *Nort.*
" trisyllaba, *Nort.*
Pachyprotasis omega, *Nort.*
Taxonus, *Sp.*
Strongylogaster longulus, *Nort.*
" pinguis, *Nort.*
" soriculatus, *Prov.*
" terminalis, *Say.*
Pœcilostoma albosecta, *Prov.*
Tenthredo mutans, *Nort.*
" rufipes, *Say.*
" semirubra, *Nort.*
" signata, *Nort.*
" verticalis, *Say.*
Tenthredopsis delta, *Prov.*
" Evansii, *Hargtn.*
Lophyrus abietis, *Harr.*
" Lecontei, *Fitch.*
Lyda fascipennis, *Cress.*
" pallimacula, *Nort.*
Oryssus Sayi, var. affinis, *Harr.*
Xiphydria Provencheri, *Cress.*
Urocerus albicornis, *Fab.*
" caudatus, *Cress.*
" cyaneus, *Fabr.*
" flavicornis, *Fabr.*
" nigricornis, *Fabr.*
Figites impatiens, *Say.*
Aulacus rufitarsis, *Cress.*
Fœnus incertus, *Cress.*
" tarsatorius, *Say.*
Ichneumon brevipennis, *Cress.*

Ichneumon canadensis, *Cress.*
" cincticornis, *Cress.*
" cœruleus, *Cress.*
" comes, *Cress.*
" comptus, *Say.*
" duplicatus, *Say.*
" grandis, *Brullé.*
" Grotei, *Cress.*
" inconstans, *Cress.*
" instabilis, *Cress.*
" munificus, *Cress.*
" navus, *Say.*
" nuncius, *Cress.*
" parvus, *Cress.*
" rubicundus, *Cress.*
" rufiventris, *Brullé.*
" similaris, *Prov.*
" subcyaneus, *Cress.*
" trizonatus, *Prov.*
" vecors, *Cress.*
" versabilis, *Cress.*
" sp.
" n. sp.
Amblyteles expunctus, *Cress.*
" nubivagus, *Cress.*
" ormenus, *Cress.*
" stadaconensis, *Prov.*
" subrufus, *Cress.*
" suturalis, *Say.*
Phæogenes orbus, *Prov.*
" tuberculifer, *Prov.*
Ischnocerus? sp.
Nematopodius, sp.
Phygadeuon acaudus, *Prov.*
" indistinctus, *Prov.*
" fusiformis, *Prov.*
" jocosus, *Prov.*
" nitidulus, *Prov.*
Phygadeuon rotundiceps, *Prov.*
" rubrocinctus, *Prov.*
" sp.
" sp.
Cryptus extrematis, *Cress.*
" robustus, *Cress.*
" rufoannulatus, *Prov.*
" n. sp.
Linoceras Cloutieri, *Prov.*
Hemiteles mandibularis, *Prov.*
Ophion bilineatum, *Say.*
" macrurum, *Linn.*
" purgatum, *Say.*
Exochilum nigrum, *Prov.*
" occidentale, *Cress.*
Anomalon anale, *Say.*
" semirufum, *Nort.*
Opheltes glaucopterus, *Linn.*
Paniscus albovariegatus, *Prov.*
" geminatus, *Say.*
Campoplex diversus, *Nort.*
" laticinctus, *Cress.*
" vicinus, *Prov.*
" alius, *Nort.*
" sp.
Limneria Guignardi, *Prov.*
" parva, *Prov.*
" rufipes, *Prov.*
" sp.
" sp.
" sp.
" n. sp.
Pyracmon macrocephalum, *Prov.*
Mesochorus, sp.
Exetastes rufofemoratus, *Prov.*
" sp.
Banchus borealis, *Cress.*
" canadensis, *Cress.*

Banchus flavescens, *Cress.*
" flavovariegatus, *Prov.*
Mesoleptus canaliculatus, *Prov.*
" sp.
" sp.
Megastylus, n. sp.
Mesoleius submarginatus, *Cress.*
" sp.
Tryphon americanus, *Cress.*
" pediculatus, *Prov.*
" seminiger, *Cress.*
Euceros Couperii, *Cr.*
Polyblastus annulipes, *Cress.*
Cteniscus clypeatus, *Cress.*
Exyston clavatus, *Cress.*
Exochoides borealis, *Cress.*
Exochus atrocoxalis, *Cress.*
" lævis, *Cress.*
Bassus orbitalis, *Cress.*
" pulchripes, *Prov.*
Coleocentrus Pettitii, *Cress.*
Arotes formosus, *Cress.* var.
Rhyssa persuasoria, *Linn.*
Thalessa atrata, *Fab.*
Ephialtes gigas, *Walsh.*
" pygmæus, *Walsh.*
" tuberculatus, *Four.*
Pimpla conquisitor, *Say.*
" 4-cingulata, *Prov.*
" inquisitor, *Say.*
" novita, *Cress.*
" Ontario, *Cress.*
" pedalis, *Cress.*
" tenuicornis, *Cress.*
" sp.
Polysphincta texana, *Cress.*
" sp.
Cylloceria occidentalis, *Cress.*
Lampronota americana, *Cress.*
" parva, *Cress.*
" punctulata, *Cress.*
" varia, *Cress.*
" sp.
Meniscus scutellaris, *Cress.*
Phytodietus vulgaris, *Cress.*
Euxorides americanus, *Cress.*
Xylonomus stigmapterus, *Say.*
" canadensis, *Hargtn.*
Odontomerus mellipes, *Say.*
" canadensis, *Prov.*
" n. sp.
Echthrus abdominalis, *Cress.*
" niger, *Cress.*
" rufopedibus, *Hargtn.*
Bracon dissitus, *Cress.*
" obliquus, *Prov.*
" n. sp.
Rhogas abdominalis, *Cress.*
" terminalis, *Cress.*
Apanteles cinctus, *Prov.*
Agathis liberator, *Brullé.*
Microdus annulipes, *Cress.*
Meteorus vulgaris, *Cress.*
Gymnoscelus pedalis, *Cress.*
Macrocentrus mellipes, *Prov.*
Leucospis affinis, *Say.*
Eurytoma auriceps, *Walsh.*
Isosoma, sp.
Monodontomerus montivagus, *Ashm.*
Perisemus prolongatus, *Prov.*
Proctotrypes rufigaster, *Prov.*
" longiceps, *Ashm.*
Pteromalia, sp.
Platygaster aphidis, *Ashm.*
Cleptes insperata, *Aaron.*

Omalus læviventris, *Cress.*
Hedychrum violaceum, *Brullé.*
Chrysis hilaris, *Dahlb.*
Camponotus herculaneus, *Linn.*, var. pictus, *Foul.*
Camponotus marginatus, *Latr.*
Formica sanguinea, *Latr.*
Myrmica, sp.
Sapyga maculata, *Prov.*
" Martini, *Smith.*
Pompilus albosignatus, *Prov.*
" cylindricus, *Cress.*
" hyacinthinus, *Cress.*
" marginatus, *Say.*
" maurus, *Cress.*
" philadelphicus, *Cress.*
" virginiensis, *Cress.*
" sp.
Agenia pulchripennis, *Cress.*
Priocnemis alienatus, *Smith.*
Ceropales fraterna, *Smith.*
Ammophila communis, *Cress.*
" luctuosa, *Smith.*
" vulgaris, *Cress.*
Sphex apicalis, *Harr.*
Astata unicolor, *Say.*
Hoplisus atricornis, *Pack.*
" ephippiatus, *Pack.*
" phaleratus, *Say.*
Cerceris nigrescens, *Smith.*
Mimesa basirufa, *Pack.*
Cemonus inornatus, *Say.*
Pemphredon concolor, *Say.*
Passalæcus mandibularis, *Cress.*
Trypoxylon frigidum, *Smith.*
Crabro ater, *Cress.*
" chrysarginus, *St. Farg.*
" cubiceps, *Pack.*
Crabro interruptus, *St. Farg.*
" maculipennis, *Fabr.*
" oblongus, *Pack.*
" producticollis, *Pack.*
" sex-maculatus, *Say.*
" villosifrons, *Pack.*
" sp.
Thyreopus advenus, *Smith.*
" coloradensis, *Pack.*
" latipes, *Smith.*
Eumenes fraternus, *Say.*
Odynerus albomarginatus, *Sauss.*
" albophaleratus, *Sauss.*
" canadensis, *Sauss.*
" capra, *Sauss.*
" catskillensis, *Sauss.*
" debilis, *Sauss.*
" leucomelas, *Sauss.*
" philadelphiæ, *Sauss.*
Polistes pallipes, *Lepell.*
Vespa maculata, *Fab.*
" scelesta, *McFarland.*
" vulgaris, *Linn.*
" sp.
Colletes americana, *Cress.*
Prosopis affinis, *Smith.*
" basalis, *Smith.*
Sphecodes dichroa, *Smith.*
" falcifer, *Patton.*
Halictus albitarsis, *Cress.*
" constrictus, *Prov.*
" coriaceus, *Smith.*
" ligatus, *Say.*
" pilosus, *Smith.*
" scabrosus, *Prov.*
" sp.
" sp.
" sp.

Augochlora purus, *Say.*
Andrena frigida, *Smith.*
" hirticeps, *Smith.*
" nivalis, *Smith.*
" vicina, *Smith.*
" sp.
Calliopsis æstivalis, *Prov.*
Nomada americana, *Kirby.*
Epeolus mercatus, *Fab.*
Cœlioxys alternata, *Say ?*
" tristis, *Cress. ?*
Osmia bucconis, *Say.*
" bucephala, *Cress.*
" frigida, *Smith.*
" lignaria, *Say.*
" simillima, *Smith.*
Monumetha borealis, *Cress.*
Anthidium simile, *Cress.*
Megachile consimilis, *Cress. ?*
" grandis, *Cress.*
" melanophæa, *Smith.*
" optiva, *Cress.*
" pugnata, *Say.*
" simplex, *Prov.*
Melissodes rustica, *Say.*
Anthophora bomboides, *Kirby.*
Clisodon terminalis, *Cress.*
Apathus Ashtoni, *Cress.*
Bombus borealis, *Kirby.*
" consimilis, *Cress.*
" fervidus, *Fab.*
" lacustris, *Cress. ?*
" ternarius, *Say.*
" terricola, *Kirby.*
" virginicus, *Linn.*

THE MEDITERRANEAN FLOUR MOTH, EPHESTIA KUEHNIELLA, ZELLER, STILL IN CANADA.

The determined and energetic fight carried on by the miller, the entomologist, and the Local Government in 1889, to stamp out this destructive mill pest in Ontario, is too fresh in the memory of those who witnessed that outbreak to warrant a repetition of the particulars. Suffice it to say that the flour moth is still very abundant in certain Canadian mills. I have received it recently in flour sent me direct from a milling firm in Valleyfield, Quebec, with an urgent appeal for help. The mill has been obliged to shut down several times during the present year to clean out the enormous accumulations of matted flour and webs in the spouts and elevator legs. The mill is a new one and has been running a very short time. It is said the pest came from a neighboring firm. My experience with this moth in California and other places convinces me that it is the worst pest millers have to combat, and this note should be a signal warning to all those interested in the milling business. I have also recently discovered the same pest in Southwestern New York State, where it has done considerable mischief this year, and is still spreading. It has occasioned much loss on the Pacific Coast also the present season. If something is not done to arrest and destroy this advancing enemy in the United States and Canada, I predict very serious results to the milling industries of both countries.

W. G. JOHNSON.

Illinois State Laboratory of Natural History, Urbana, Ill.

ASPIDIOTUS PERNICIOSUS, COMSTOCK, AND AONIDIA FUSCA, MASKELL: A QUESTION OF IDENTITY OR VARIATION.

BY W. M. MASKELL, WELLINGTON, NEW ZEALAND.

In the "Report of the Entomologist of the United States Department of Agriculture for the year 1880," Professor Comstock described (p. 304) an extremely injurious insect of the family Coccidæ, to which he gave the name ASPIDIOTUS PERNICIOSUS, or "the pernicious scale," and he stated that this insect attacked a very large number of deciduous fruit-trees in California, "excepting peach, apricot, and black tartarean cherry." Later, this pest was observed, described and discussed by many persons interested in horticulture, and in America it is generally known by the trivial name of "the San José scale," and is looked on as a most troublesome thing.

An article in "Insect Life," Vol. VI., No. 5, September, 1894, contains much information relative to this insect, and its occurrence in various places in America since 1880. Here and there the scale appears to have been found on peach, but only in small quantity; the principal victims are pear, plum, Japanese plum, apple, currant, etc., and most especially pear. In a subsequent article ("Insect Life," Vol. VII., No. 2, p. 165) the same trees are mentioned, with the addition of Japanese quince, and elm (American ?). Again, in the same publication (Vol. VII., p. 285) the pear is given as the chief victim of this scale.

In the Agricultural Gazette, of New South Wales, September, 1892, p. 698, Mr. A. S. Olliff reports ASP. PERNICIOSUS in Australia on pear.

In September, 1894, I received from Mr. French, of Melbourne, some twigs of peach trees thickly covered with a scale which, in my paper on Coccidæ (read November, 1894; published in Transac. New Zealand Institute, Vol. XXVII.), I identified as belonging to the genus AONIDIA, and named AON. FUSCA.

In March, 1895, the same gentleman sent me some apple twigs with many scales, which I found to be ASPIDIOTUS PERNICIOSUS.

Finally, in July, 1895, Mr. Olliff sent me twigs of pear, peach, and apple, from New South Wales, much infested by ASPIDIOTUS PERNICIOSUS.

It was whilst examining these last specimens that the characters which I observed in the adult females led me to compare them closely with those of AONIDIA FUSCA, and, as a result, I cannot help being considerably perplexed.

The opinion which, for many years past, I have persistently advocated, as regards the study of Coccidæ, is that it is always better to base distinctions, where possible, upon anatomical characters of the insects themselves, rather than upon external features of the coverings, waxy or cottony, or otherwise, under which they are sheltered. These coverings may vary so much according to accidental circumstances that I think they should be considered as of secondary, or even less, importance. In the case of the two insects of which I am now treating, I am sorry to say that I did not adhere strictly enough to my own rule. Size, colour, form of the scale, food-plant, and such like things, have been so greatly insisted upon, as I find, in all the accounts of ASPIDIOTUS PERNICIOSUS, that I have perhaps attached too much importance to them, and, consequently, it is possible that my identification of AONIDIA FUSCA is erroneous.

All the authors who describe ASP. PERNICIOSUS give the following characters of it :—

1. The scale is "gray"; the pellicles "yellow or reddish-yellow," "sometimes black."
2. When on twigs, "the wood beneath the bark is stained red"; "the cambium layer of wood is stained purplish"; the "peculiar reddening effect on the skin is a very characteristic feature"; "the cambium layer frequently becomes deep red or purplish"; "if the twig be scraped with the finger-nail, a yellowish oily liquid will appear."
3. The diameter of the female puparium, or scale, is given by Comstock as about one 13th inch. I do not find it in other writers.
4. The principal food-plant, as mentioned above, is the pear; when the peach is mentioned it is only incidentally, or as very slightly attacked.
5. No mention is made by authors of the second female pellicle as being any larger than the adult female.

Now, in all the foregoing characters, the specimens on which I founded my AONIDIA FUSCA differ from ASP. PERNICIOSUS; and if one might accept as positively final the statement in "Insect Live" (Vol. VIII., p. 289), that "the San José scale differs from all others in the peculiar reddening effect which it produces," then there would be no more to be said; for AONIDIA FUSCA produces, as far as I know, no such effect. In size, A. FUSCA is much smaller, the female puparium having a diameter of one 35th inch. In colour it is "very dark brown or dull black;

and again, A. FUSCA is decidedly numerous on peach twigs. Lastly, the second female pellicle is larger than the adult insect.

Judging, therefore, by all the external characters (except that of the second pellicle, of which I find no record), AONIDIA FUSCA is different from ASPIDIOTUS PERNICIOSUS.

But a careful comparison of the adult female insects shows that, with the exception of size, their characters are very similar. My specimens of ASP. PERNICIOSUS (originally received from Professor Comstock) average one 25th inch in length; those of AON. FUSCA average one 65th inch.

In colour the two agree; also in the absence of any groups of "spinnerets"; also in the terminal lobes, hairs, and indentations of the abdomen. The two last characters are of especial importance; so much so that I am strongly inclined to think that I made a mistake in separating the two insects, at least specifically. The identity of my Australian specimens of ASPID. PERNICIOSUS with those from America is absolute; my Australian AONIDIA is anatomically very close to both, the principal differences being external.

It remains to discuss the generic character of the comparative dimensions of the adult female and the second pellicle, a character which distinguishes AONIDIA from ASPIDIOTUS. I have already remarked that I find no notice on this point in any author as to A. PERNICIOSUS; but as regards A. FUSCA I have no doubt, and I possess a mounted specimen of an adult with the second pellicle still attached, the difference in size being perfectly clear; the pellicle extends all round beyond the adult. Assuming, therefore, that it may be necessary to unite the two insects, and to make FUSCA a variety of PERNICIOSUS on the ground of anatomical similarity, ignoring the external differences, it will become a question, then, of removing PERNICIOSUS from the genus ASPIDIOTUS and of attaching it to the genus AONIDIA.

It is stated in "Insect Life," Vol. VI., p. 362, that while the origin of A. PERNICIOSUS is uncertain, the probability is that it came to America from Japan. I believe that Mr. Koebele is in Japan at present studying the Coccidæ of that country; and he has, perhaps, discovered the native home of this injurious pest. But, in a letter which I received from him a few months ago, he says that the Japanese will not permit any specimens of insects to be sent thence by post; and we must wait till Mr. Koebele himself leaves the country to learn more about this scale. Mr. Benson, of Sydney, however, tells me there have been many fruit trees imported into Australia of late years from Japan.

ON AGROTIS TRITICI, LINN., AB. SUBGOTHICA, HAW., AND AGROTIS JACULIFERA, GN.

BY J. W. TUTT, F. E. S., LONDON, ENGLAND.

I have read with interest the paper by Mr. Slingerland, CAN. ENT., XXVII., p.p. 301–308, and as my name is occasionally mentioned, I trust to the courtesy of our Editor to allow me to reply.

In the first place, I would premise by suggesting that Mr. Grote had more than the bare statement of mine quoted by Mr. Slingerland on p. 302, and was not guided by that alone. He had, I presume, at least seen my notes in the *Entomologists' Record*, and in *British Noctuæ and Their Varieties*, Vol. II. These Mr. Slingerland appears to have overlooked.

I would point out to American readers that Haworth called his book *Lepidoptera Britannica*, that he described no species knowingly that were not British, and that the onus of proving that he did so rests on Mr. Slingerland, and those who think with him. I would point out also that although Mr. Grote and Prof. Smith may not "have ever seen the original description of *subgothica*," yet I can assure Mr. Slingerland that I had, and that as Mr. Grote, according to his letter, based "his recent revision on the authority of Mr. Tutt," it matters little whether Mr. Grote saw it or not, for he shifts the onus upon my shoulders.

With regard to the species in dispute, I would refer your readers to the quotation referring to the species Haworth described *(vide*, ante. p. 302), in which Haworth says of the species "Habitat in Anglia valde infrequens."* Now, Mr. Slingerland has to face this point. The American species does not occur in England; the species Haworth describes does occur in England; therefore the species that Haworth describes cannot possibly be the American species, by any laws of logic I know.

As Mr. Slingerland says, "No figure of the insect is given"; therefore the whole value of Haworth's name rests on his description. The first question, it seems to me, is not, "Is there anything in it that does not apply to our American insect?" for thus far we have not come to the possibility of its being American, but rather, "Is there any British insect to which it applies absolutely?" and I say, yes! most decidedly, yes! and the insect to which it applies is one of the endless forms of *Agrotis tritici*.

*This was written in 1810, and Mr. Slingerland does not suggest the possible introduction of American specimens into England until 20 years later.—J. W. T.

Mr. Slingerland evidently does not know our British *Agrotis tritici;* it is outside my brief to go into the protean forms it exhibits, but when I say that my series comprises some 2,500 specimens, which have received something like twenty-five different specific names, and a mere summary of these occupies 15 p.p. in *The British Noctuæ and Their Varieties*, your readers will see that Mr. Slingerland is treading on treacherous grounds when he is dealing with the subject, and suggests that British lepidopterists cannot name their own insects, for this is undoubtedly the ultimate conclusion of his line of argument.

Now, it is quite evident from Mr. Slingerland's remarks (p.p. 302–303) that whatever specimens Haworth (before 1810) described his *subgothica* from, Mr. Stephens (1829) did not describe the same specimens, for he described his from specimens obtained from Mr. Raddon, and the specimens were labelled, "near Barnstaple, Devon." Now, I have to add, as a matter of personal knowledge, that the coasts near Barnstaple, Devon, produce *A. tritici* in immense numbers, and I can assure Mr. Slingerland, and all other American entomologists, that I can match exactly the specimens which Stephens figures, and Humphrey and Westwood copy, with undoubted genuine specimens of *Agrotis tritici*, and I quite agree with my friend, Mr. C. G. Barrett, that these figures certainly represent a variety of *tritici.*

We now come to Mr. Slingerland's first move into the mists of probability, and I would suggest to Mr. Slingerland that probability is not critical science. I refer to Wood's figure, reproduced in the plate, fig. 1b. Mr. Slingerland says:—"I think that a glance at the next figure of the insect that appeared, taken, doubtless, from Stephens's specimen,* will remove all doubt as to what insect Stephens tried to represent." I object absolutely to this premise. There is not a scintilla of evidence to warrant such an assertion. We want facts and deductions therefrom. We do not now, three-quarters of a century after publication, want an assertion made as being "doubtless," without a single fact to support it.

Now, "up to 1847," Mr. Slingerland very rightly observes that English Entomologists considered *subgothica* a British insect, and a distinct species. Then Mr. Doubleday stated that "Haworth's insect is evidently simply a variety of either *Agrotis tritici* or *aquilina.* The species described by Stephens is American." Now, it is strange that I had never noticed this reference before, but it fortifies my position. It

*I have referred to this statement in detail farther on.

must be observed that Doubleday was the authoritative link binding the "Stephens" generation with the present, and his independent opinion alone would not have to be lightly passed over. My own conclusion being at one with his as to *subgothica*, Haw., I take as affording one more link in the strong chain of independent evidence that I have been able to collect. On p. 305, Mr. Slingerland says :—"Curiously enough" (had I been he I should have said 'naturally enough'), "the English authors have claimed Haworth's insect as a variety of their *tritici*. Doubleday said it was 'simply a variety of either *tritici* or *aquilina*,' but it was soon restricted to the former in British lists, and it is still considered as such by Mr. Tutt." In Doubleday's time, *Agrotis tritici* and *A. aquilina* were considered as distinct species, but for the last thirty or forty years it has been well known that *aquilina* is simply a local form of *tritici*, and that the two erstwhile supposed species copulate indiscriminately*. The Continental (European) and British Entomologists have long ago deprived it of specific rank. Therefore, Mr. Doubleday's conclusion and mine are identical.

Mr. Slingerland says that "the evidence in support of considering Haworth's *subgothica* as a variety of *tritici* (or *aquilina)* seems to be confined principally to the simple statement of Doubleday, although Tutt intimates that he has seen Haworth's description." This is really too ingenuous. Haworth's *Lepidoptera Britannica* was the hand book of British Lepidoptera, and in the hands of every British collector until the publication of Stainton's *Manual* in 1858. Every British collector had his "Haworth" then, just as everyone has his "Stainton" now, and I can only hope that this statement will be sufficient to brush out any doubtful remnants of the implied suggestion contained in this remarkable paragraph.

I am totally unable to untangle the line of thought in which Mr. Slingerland has got on p. 303 when he writes :—"For many years after this the name *subgothica* rarely appeared in British lists, and only as a variety of *tritici;* it apparently does not occur at all in recent lists. It has never been taken in England, so far as I can find any record since Stephens's time." Evidently, when our leading lepidopterists had worked out the true position of Haworth's *subgothica*, it would disappear

*For purposes of sale British collectors still keep them separate, and some conservative lepidopterists, who believe nothing they do not see themselves, even write of them as being so.—J. W. T.

from the British lists, for, from that time forth, it ceased to exist as a distinct species, and became naturally a synonym of the older name of the same species *tritici*, Linn., unless the list contained varietal names as well as specific, when *subgothica*, Haw., would naturally fall as a variety of *tritici*, Linn. To say that *subgothica*, Haw., has "never been taken in England since Stephens's time" is absurd, and begging the whole question, for dozens are taken every year (from my point of view), whereas if Mr. Slingerland refers to Guenée *jaculifera*, it, of course, never has been taken in England, neither in Stephens's time, before his time, or "since his time."

We come now to the first introduction of the species into American literature, the year 1856, Mr. Slingerland informs us, and then Dr. Fitch applied to an American species the name *subgothica*, Haw. On what grounds Dr. Fitch did this we cannot tell; evidently he did not know of Doubleday's conclusion in 1847, but I will say this—that the general similarity between some examples of the two species, and the small amount of systematic work which had been done in the American *Noctuæ* in 1856, are more than enough to excuse Dr. Fitch for supposing they were identical; nor do I think that Mr. Slingerland scores a point when he states that "no American writer has seriously questioned the identity of our species with the *subgothica* of Stephens and later English writers, or even with the *subgothica* of Haworth until 1891, when Mr. Grote changed his mind in accordance with the opinion of Mr. Tutt." Can Mr. Slingerland wonder at this? What American entomologist had the slightest knowledge of our British *Noctuæ*? I will go farther and ask—What American *has*? And now I will execute a bouleversement and ask—What British entomologist knows anything of American *Noctuæ*? You may answer, Mr. Walker and Mr. Butler; but Mr. Walker's ignorance was notorious, and the present condition of the *Noctuæ* in the British Museum is sufficient proof that Mr. Butler cannot name the commonest British species. The whole thing is too absurd. The name was never questioned, because there was no one to question it.

Now we come to Doubleday's statement *re* "the species described and figured by Stephens is American," and his explanation that he had "traced all the specimens which he had seen of this species (the one described by Stephens) in collections of British Lepidoptera to one source, and I believe the gentleman who distributed them inadvertently mixed a number of the North American insects with his British ones,"

and goes on with a statement that is utterly damaging to "the gentleman's" veracity, or as to his consummate carelessness; but still the unexplained factor remains, viz., that forms of *A. tritici* identical with that figured by Stephens are in many British collections, that the locality given by Raddon is a *bona fide* one for *A. tritici*, and that at a time when there were fewer collectors and few specimens the form figured may not have been well known to Mr. Doubleday.

Now, let us grant for a moment that the variation of *A. tritici* and *A. jaculifera*, Gn., is so closely parallel; nay, so identical, that two specialists at this group, as I suppose Mr. Slingerland and myself to be, cannot see any difference in certain figures claimed for both species—in other words, that what I have no hesitation in referring to *A. tritici*, he has no hesitation in referring to *A. jaculifera*. What bearing, I would ask, has that on Haworth's description? Haworth was dead, and his work was published years before, and he could have had none of Raddon's specimens. He described, evidently, from perfectly different specimens from those used by Stephens. Therefore, even if Raddon fraudulently deceived Stephens, it is clear that he did not deceive Haworth, and until Mr. Slingerland can show some more definite facts relative to Haworth's *subgothica*, he must excuse us if we refuse to change an opinion held by successive generations of British entomologists, viz., that *subgothica*, Haw., is what Haworth described it as, and verily believed it to be, a British and not an American species, and which no one supposed it to be until Dr. Fitch's introduction of the name in America, for, be it observed, the doubt thrown by Doubleday was not on *subgothica*, Haw., but *subgothica*, Stephens. Mr. Slingerland now touches upon what he evidently considers the clinching part of his argument. He asks: "Is Haworth's *subgothica* the same as Stephens's. Probably Haworth's single type specimen could not now be found, if it exists at all." Mr. Slingerland can take the latter for ganted. Haworth's type specimen would have been found years ago were it findable. That being so, we are told we must "depend on the original description and a little circumstantial evidence to settle this point." I have before stated that Doubleday and all British authors for almost a century have known perfectly well that Haworth's description refers to a well-known form of *Agrotis tritici*, and the evidence is in favour of this view, but the "circumstantial evidence" must be examined carefully. Mr. Slingerland says that "Haworth's *specimen might easily* be one which Mr. Barrett recently found in an old

English collection, made up of specimens obtained from older collections by a Mr. Burney, who was contemporary with—and corresponded with—Haworth and others, and many of whose insects fell into his hands." Now, Haworth died about 1830; Burney died in 1893, aged 79 years. At the time of Haworth's death, therefore, Burney was a boy of 16, and his correspondence (if any) with Haworth must have been of the most casual character. Again, Haworth's insects were sold, and Burney would have remembered had he bought it; but boys of 16 do not, as a rule, affect sale-rooms, and at this time Burney was a boy at school. It is on Haworth's sale catalogue, Mr. Slingerland says, so Haworth did not give it to Burney as a result of correspondence. Now we come to "the specimen" mentioned by Mr. Barrett. I also saw the specimen—one of the American *jaculifera*. It had no label, no hint of its origin, and it was present with dozens of other *foreign* specimens, with not the slightest claim to be considered British. Two years ago Mr. Burney's collection was sold. That collection was a marvel. It had been collected just as some men collect "old pots" or "toothpicks." Everything buyable had been bought, and in England, as elsewhere, you can buy anything if you will only pay enough. There were dozens—nay, hundreds of foreign specimens that he had paid big prices for, and obtained with them a British warranty; many of the insects bore well-known lepidopterists' names—some bore my own. So gross was the fraud, that I disowned some of the latter in the sale-rooms. The whole collection was a scientific lie from beginning to end, and among the foreign specimens sold—it was not even labelled or suggested as British—was this American specimen of *jaculifera*. What Mr. Dale surmises is quite beside the question; there are hundreds of people in England who can guess—more, perhaps, in America—and when Mr. Dale ventures, without the slightest shred of evidence, to suppose that it "probably came from Mr. Raddon," his wild guess made of people who lived and died before he was born, helps to cut away the ground from under Mr. Slingerland's feet, for even if every assumption be made that this was a specimen introduced into Britain with a fraudulent design in 1829 (the date of Stephens's *Illustrations*), it could not have been the specimen that Haworth described anterior to 1810; and these are the facts on which Mr. Slingerland "believes that the weight of evidence indicates that the *subgothica* of Haworth and Stephens were the same species." I would only ask, Is this logic, or is it science! if not —what is it?

For a scientific man, Mr. Slingerland must be easily satisfied; but I would urge again that guesswork is not science. I maintain that Haworth's description of *subgothica* refers word for word to a certain form of *Agrotis tritici*. I maintain that Mr. Slingerland has not brought forward one scintilla of evidence to upset Haworth's statement that his species has its "habitat in Anglia; I maintain that Mr. Slingerland has not brought forward the ghost of a fact to assume that *subgothica*, Haw., is or is not even identical with *subgothica*, Steph.

With regard to the latter, I must assume that Mr. Slingerland has had at least as much experience with the various forms of *Agrotis jaculifera* as I have had with those of *Agrotis tritici*, and, therefore, that his opinion is as good as mine; but I still maintain mine, he will maintain his.

Now we come to a matter of expediency. Is it worth while to perpetuate a name about which so much doubt exists? Suppose Mr. Slingerland and myself let our difference die a natural death, the same duel will be fought again and again between our successors, who will view the matter from our respective standpoints.

Now, about Guenée's figure (1d) there can be no doubt. It does not represent any possible form of *Agrotis tritici*. Here, then, is the first unquestioned figure of the American insect. It is the only reasonable name to apply to it, but that is a matter for Mr. Grote and Prof. Smith, and not for me. I simply state facts. *Agrotis tritici*, var. *subgothica*, Haw., is a living fact to me, so is *Agrotis jaculifera*, Gn. For my part I shall continue to write:—

Agrotis tritici, Linn.

ab. subgothica, Haw.

2. Agrotis jaculifera, Gn.

And Mr. Slingerland can add, if he chooses, to the latter (? subgothica, St.). This is what facts warrant, and when we change facts for opinion we are doing a sorry thing for science.

Mr. Slingerland says, p. 303: "This figure, which is reproduced as 1b on the plate [it is enlarged to natural size], is from Wood's *Index Entomologicus*, pl. 9, fig. 149 (1839). All must admit that it is one of the best figures of our American species ever published." I have compared it carefully with the figure from nature, and mark the differences: Wood's figure (1b) may be the best of the figures of the American species ever published, but it represents equally well many specimens of *A. tritici* in my cabinet, and the question arises how far we are justified in considering these as two distinct species at all; whilst for two male specimens of the

same species the abdomina are singularly unlike. Indeed, Mr. Slingerland's references to the figures seem remarkably unhappy, for if Wood's figure is one of the best figures of the American insect ever published, it is singularly unlike the figure from nature above it, and to suppose that Wood's figure (1b) and Stephens's (1a) are from the same specimen seems to suggest great incapacity on the part of one of the artists to reproduce what he saw. Figs. 1 and 1d represent nothing British, but for the remainder there is nothing to add.

I would now draw Mr. Slingerland's attention to an important fact that he has altogether overlooked, viz., the connection between Doubleday and Guenée. It is a matter of history that almost all the N. American species Guenée possessed were obtained from Doubleday and Desvignes, and that most of his work was submitted to Doubleday before publication. It was, therefore, with Doubleday's full knowledge that *jaculifera* was described, and I observe that Guenée in his *Histoire, etc. (Noctuelites)*, Vol. V., p. 262, actually described his *jaculifera*, var. B., from specimens in Doubleday's collection. It is quite evident that with the mutual understanding between Doubleday and Guenée, that Doubleday agreed with Guenée's nomenclature of the American species in 1852, and equally certain, in the face of what he had written in 1847, that he considered the species quite distinct from *subgothica*, Haw.

Mr. Slingerland, in his quotation of my note that "I do not know the American *subgothica*," rather misstates my present position. I have examined all the specimens in the British museum repeatedly since 1891, and know well what I am talking about, and his suggestion that I am an "English writer, who does not know the American insect," is rather startling and far-fetched, and would have been more warranted had Mr. Slingerland written his article five years ago.

One other point only interests me in the note, and in that I am pleased to be able to agree with Mr. Slingerland. There is no doubt Guenée's name, *jaculifera*, refers to the insect known as such, that his var. B. must be called *tricosa*, Lintner, and that his var. B. = *herilis*, Grote. It may be interesting as bearing out Mr. Slingerland's position that Guenée probably *had no specimens* of *jaculifera*, but that he described Desvignes and Doubleday's specimens; that these Entomologists must have had several specimens is pretty evident, for Guenée writes (*Ibid.*, p. 262): "Amerique Septentrionale; Canada Coll. Div. Parait trés-commune; whilst of var. B. he specially notes: "Etat de New-Yorck, Coll., Dbday."

I have tried to be explicit even at the risk of offending our Editor by being too verbose. I am afraid even now that I may have to explain doubtful points. At any rate I trust I have been logical enough to convince my two good friends, Prof. Grote and Prof. Smith, that on the score of "scientific truth," as well as on the score of "expediency," it is not well that two distinct species should be known in Europe and America by the same name, and that the true name henceforth for the American species—much as I detest upsetting old associations—must be *Agrotis jaculifera*, Gn.

EXOMALOPSIS, A NEOTROPICAL GENUS OF BEES IN THE UNITED STATES.

BY T. D. A. COCKERELL, N. M. AGR. EXP. STA.

The genus *Exomalopsis*, Spin., was founded in 1851 on a couple of bees from Para, Brazil. Three years later, F. Smith described three additional species, also from Brazil. More recently, species have been described or recorded from Cuba, Jamaica, and Mexico, but none hitherto from the United States. One species, *E. pulchella*, Cr., has a remarkable range, being found in Cuba (Cresson), Jamaica (Fox), and Lower California (Fox). I myself have taken it in Jamaica.

The species now described has rather an extensive range in the upper Sonoran zone of New Mexico.

Exomalopsis solani, n. sp.— ♀ about 8 mm. long, anterior wing about 6 mm. Black, polished, very shiny, pubescence all pale. Head broad, subtriangular seen from the front, eyes narrow; occiput and cheeks fringed with pubescence, silvery-grayish and subappressed on cheeks; erect, duller, and subochraceous on occiput. Vertex bare, but the occipital hairs extend forward behind the ocelli. Front with copious white hairs, seeming to radiate from the antennal sockets; clypeus and labrum with rather thin yellowish pubescence. Antennæ black, the last half of the flagellum becoming rufous; 2nd joint of flagellum equal with 3rd, or, if anything, rather shorter. Mandibles black; 4th and 5th joints of maxillary palpi of equal length, 6th shorter. In another specimen the 4th joint is clearly longer than the 5th. Glossa reddish, the tip obtuse.

Thorax with rather dense pubescence, except the scutellum, hind half of mesothorax, and dorsum of metathorax, which are bare. The dorsal pubescence is dull yellowish-gray, with even a few black hairs immediately behind the scutellum and at the sides of the mesothorax; on the hind border of prothorax is some dense short pale pubescence, showing through the longer hairs. At the sides of the metathorax and on the pleura the pubescence is whitish. The exposed portions of the meso- and metathorax are practically impunctate, but the pleura is very strongly punctured. Tegulæ large, piceous. Wings smoky-hyaline, stigma and nervures piceous; marginal cell long, pointed; 2nd submarginal not half as big as the 1st or 3rd, a little narrowed above; 3rd submarginal narrowed nearly one-half to marginal. Femora and tibiæ black; tarsi rufescent. Pubescence of legs whitish, that of tarsi reddish behind. Tibio-tarsal brush of hind legs very large, the hairs very distinctly plumose,

whitish or dull silky white, not at all gray or black, but rufescent on tarsi beneath. Claws very strongly bifid.

Abdomen short, nearly subglobose; bases of segments with sparse silky pubescence; hind margins of segments 2–4 and sides of hind margin of 1st segment with narrow even bands of pure white pubescence, very conspicuous.

Hab.—First found at Albuquerque, N. M., not uncommon on flowers of *Solanum elæagnifolium* between the old and new towns, Aug. 16, 1895. On Oct. 13 I took one at Las Cruces, N. M., on a plant supposed to be *Flaveria*. Specimens were also taken at Las Cruces by Mr. C. Rhodes, on *Verbesina encelioides* and *Bigelovia Wrightii*, early in October.

Curiously, this insect seems to resemble the West Indian types rather than the Mexican. I sent one to Mr. Fox, who remarks that it "differs from any in our collection by the narrow, continuous, white fasciæ of abdomen, which are more regular than in the related species. From *pulchella* and *similis* it differs by the apparently unicolorous pubescence of hind tibiæ, and again from *similis* by the dorsulum being polished and impunctate medially." The Mexican species nearly all have black pubescence.

ENTOMOLOGICAL SOCIETY OF ONTARIO.

At the annual meeting held in London, on the 27th and 28th of November last, the following gentlemen were elected to hold office during the ensuing year:—

President—J. Dearness, London.

Vice-President—H. H. Lyman, Montreal.

Secretary—W. E. Saunders, London.

Treasurer—J. A. Balkwill, London.,

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Auditors—J. H. Bowman and J. M. Denton, London.

The annual subscription ($1), now due, should be sent to the Treasurer, J. A. Balkwill, Victoria Hall, London, to whose order money orders or drafts should be made payable.

BOOK NOTICES.

A HAND-BOOK OF BRITISH LEPIDOPTERA, by Edward Meyrick, B. A., F.Z.S., F.E.S., assistant master at Marlborough College. London: MacMillan & Co., and New York, 1895

This book of 843 pages, illustrated by 104 cuts of venation, describes all the British species of Lepidoptera, 2,061 in number, with descriptions of the genera, families and superfamilies. Full synoptic tables are given, leading down to the separation of species. For the recognition of species, for which it is intended, the work seems admirably adapted. A brief notice of the larva of each species is given, but not enough for identification. What is said, however, is useful and also serves to indicate those species whose life-history is still imperfectly known. The work on the imagoes is stated to be the result of the author's independent observation, but the larval descriptions are compiled. No species are figured. The nomenclature, especially of the higher groups, is occasionally unsatisfactory. There is no synonymy and no references to literature, so that some of the family names are meaningless till after a careful examination of the species included. Some of the changes seem arbitrary and contrary to the rules of priority; *e. g.*, where the Thyatiridæ are called "Polyplocidæ," and the Eucleidæ (=Limacodidæ), "Heterogeneidæ," without any explanation. The spelling of the family names does not conform to the general present custom. A few new genera are described among the Tineids.

The most original and most interesting part of the book is the classification of the Lepidoptera into superfamilies. It differs from any hitherto presented, but is strictly on the lines laid down by recent workers as reviewed by Mr. Tutt (Trans. Ent. Soc., London, 1895, p. 343). Nine superfamilies are created, the lowest, the "Micropterygina," correspond-

ing exactly to Prof. Comstock's Jugatæ, although not elevated to the rank of a suborder. I reproduce the classification in full, adding, in brackets, certain explanations of the family terms.

1. CARADRININA.
   - Arctiadæ [=Sarrothripus, Cymbidæ, Lithosiidæ, Nolidæ, and Arctiidæ].
   - Caradrinidæ [=Noctuidæ with vein 5 of secondaries weak, and Apatelidæ].
   - Plusiadæ [=the other Noctuidæ].
   - Ocneriadæ [=Lymantriidæ and Colocasia (Demas)].

2. NOTODONTINA.
   - Hydriomenidæ, Sterrhidæ, Geometridæ, Monocteniadæ, Selidosemidæ [= Geometridæ and Brephidæ].
   - Polyplocidæ [=Thyatiridæ].
   - Sphingidæ
   - Notodontidæ.
   - Saturniadæ.

3. LASIOCAMPINA.
   - Drepanidæ.
   - Endromidæ.
   - Lasiocampidæ.

4. PAPILIONINA.
   - Nymphalidæ.
   - Satyridæ.
   - Erycinidæ.
   - Lycænidæ.
   - Pieridæ.
   - Papilionidæ.
   - Hesperidæ.

5. PYRALIDINA.
   - Phycitidæ.
   - Galleriadæ.
   - Crambidæ.
   - Pyraustidæ.
   - Pyralididæ.
   - Pterophoridæ.
   - Orneodidæ.

6. PSYCHINA.
   - Psychidæ.
   - Zeuzeridæ [=part of Cossidæ].
   - Zygaenidæ [=Authroceridæ].
   - Heterogeneidæ [=Eucleidæ].

7. TORTRICINA.
   - Epiblemidæ.
   - Tortricidæ.
   - Phaloniadæ.
   - Trypanidæ [=part of Cossidæ].

8. TINEINA.
   - Aegeriadæ [=Sesiidæ].
   - Gelechiadæ.
   - Oecophoridæ.
   - Elachistidæ.
   - Plutellidæ.
   - Tineidæ.

9. MICROPTERYGINA.
   - Hepialidæ.
   - Micropterygidæ.

It appears that the superfamilies 5 to 8 correspond to my Tineides, 4 to the Papilionides, 1 to 3 to the Agrotides with the exception of two families under the "Notodontina," the Sphingidæ and Saturniadæ, which

I consider as of superfamily rank. With the exception of these two unwarranted (as I think) associations, there seems little fault to find with the classification. I will leave to Mr. Grote the correction of the family and superfamily names, as he has paid especial attention to the determination of types, and the effects of the application of priority rules. The importance of such work is made very evident by Mr. Meyrick's book, if we are ever to have a uniform and stable nomenclature.

It is evident now that Lepidopterists are practically agreed on the general classification of the Frenatæ. As to the exact limits of superfamily groups, there is yet, unfortunately, scarcely an approach toward agreement.

HARRISON G. DYAR.

THE CAMBRIDGE NATURAL HISTORY, Vol. V. Peripatus, by Adam Sedgwick, M.A., F.R.S., etc.; Myriapods, by F. G. Sinclair, M.A.; Insects, Part I., by David Sharp, M.A. (Cantab.), M.B. (Edinb.), F.R.S. Macmillan & Co., London, and New York, 1895.

Under this title has been given to the public a work which bears out in every way the deservedly high reputation of the writers. From its style of treatment of the subject, the book may be read with pleasure and profit by general student and specialist alike, while to the instructor who wishes to bring before his pupils the results of late researches, though out of reach of large libraries, it will prove a most valuable aid.

The chapter on *Peripatus*, by Mr. Sedgwick, is in itself a model memoir, and the twenty-six pages devoted to the curious creature are made up for the most part of original studies by the author, who has previously published important monographs on this subject. The historical and morphological matter, which is fully illustrated by fine figures, is followed by a synopsis of all the known species, with notes on their differential characters and geographical distribution—the map which forms the frontispiece of the volume showed them to be confined to the region south of the Tropic of Cancer. The discussion of the affinities of *Peripatus* to the Arthropoda and Annelida is of great interest to the zoologist, whatever his beliefs in regard to the theory of descent.

From Mr. F. G. Sinclair we have the chapter on Myriapoda. The preliminary account of these animals contains some charmingly written notices of their habits, and marks the author as a faithful observer in the field as well as in the laboratory. A short sketch of the classification follows, with brief definitions of the families and figures of typical forms,

Several pages which are devoted to the anatomy and embryology of the group, and are embellished by many useful figures, are succeeded by an account of the fossil forms and by a discussion of the zoological position of the class.

Dr. Sharp has taken up the Insecta (Hexapoda) in the third chapter, and nearly five hundred pages are devoted to the general consideration of the subject and a careful review of the Aptera (Thysanura and Collembola) the Orthoptera (inclusive of the Forficulidæ), the Neuroptera (under which name he includes several of the groups given ordinal rank by Brauer, Packard, Comstock, and others) and the lower families of the Hymenoptera. The remainder will follow in future volumes, which the Entomological world will look forward to with much interest. No one who is familiar with the work of the author needs to be assured of its excellence, and it will be sufficient to state that the literary side is fully as well upheld as the scientific. The reader whose knowledge of scientific terms is limited will find that careful attention has been given to making them clear, while the specialist will see that many important points, simply touched upon or slurred over by most text-books and "Natural Histories," are here elaborated by a master hand. The figures of large and bizarre forms of Orthoptera and the accounts in the text of their wonderful adaptation to environment convey a most instructive lesson. A remarkable case of resemblance to an ant is shown by a small Locustid (*Myrmecophana fallax*) which, with a form of body recalling in general that of an ant, is dependent for the "stalk" or pedicel of the abdomen upon a white spot on each side of the body, leaving only a narrow dorsal line dark.

We have not room to speak of all the groups in detail, but mention should be made of the very interesting accounts of the Termites, or white ants. To the inquiring mind, also, the practice of citation of authorities by means of foot-notes must commend itself—this plan being followed throughout the work. The beauty and careful selection of the illustrations deserve special remarks, while the press work is of the best. On the whole, we must consider the enterprise as one meriting the support of every entomologist who cares to see the treatment of his favourites placed in the hands of those competent to properly deal with it and who are able to give us a well-written, thoroughly interesting and reliable guide.

H. F. WICKHAM.

Mailed January 15th, 1896.